

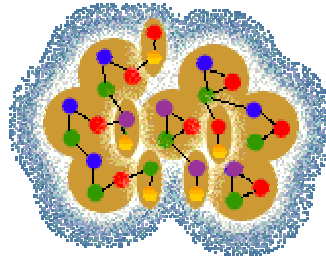
$J/\psi \rightarrow e^+e^-$ Measurement in d+Au Collision at $\sqrt{s_{NN}} = 200$ GeV

S. Kametani for the PHENIX
collaboration

Physycs motivation

■ Quark Gluon Plasma

- New phase of matter created at high density/temperature.



- Deconfined quarks and gluons are freed from hadron confinement

■ Deconfinement of hadron leads to

■ J/ψ suppression in QGP

- Initial J/ψ “melt” in QGP because of color Debye screening

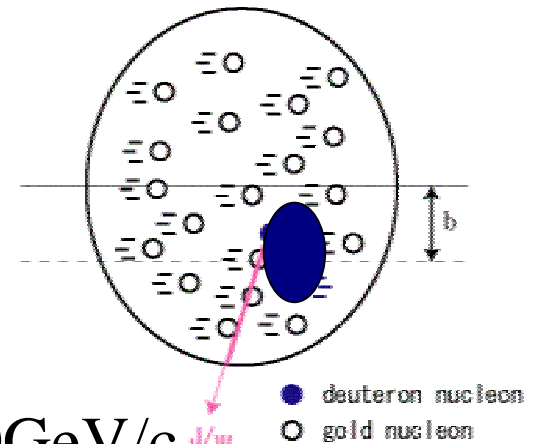
■ J/ψ enhancement at hadronization

- Mobility of heavy quarks in the deconfined region leads to recombination into charmonium

PHENIX year-3 run

■ d+Au collision

- Base study on nuclear effect is required for heavy ion collision in **normal matter** to qualify QGP effect!
 - Absorption in nuclear matter
 - Shadowing effect in large $|x_F|$
- These effects are more apparent as Nucleus is large. (as Number of participants in collision is large)



CERN NA50 experiment in p+W at 200GeV/c

$$\sigma_{J/\psi}^{\text{abs}} = 4.3 \pm 0.6 \text{mb}$$

PHENIX setup

- Vertex, Centrality

- Beam Beam Counter

- Tracking

- Drift Chamber
- Pad Chamber

- Energy measurement

- EM Calorimeter

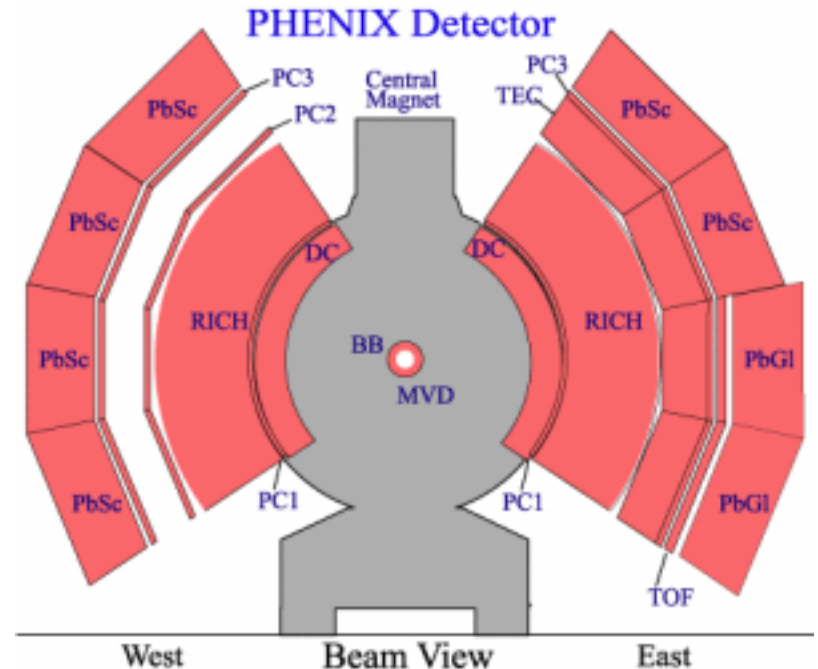
- Electron ID

- RICH

- eID p_T range : 0.2 ~ 4.9 GeV/c

- Trigger

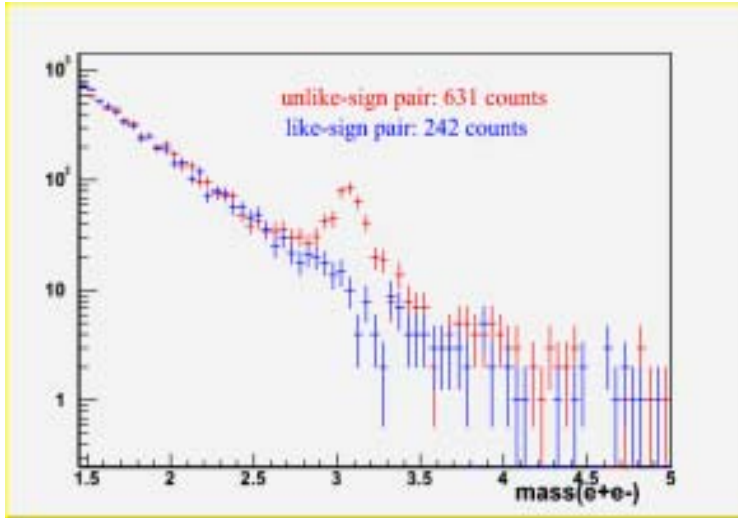
- BBC for collision and event vertex
- RICH + EMC mix (ERT) for electron trigger



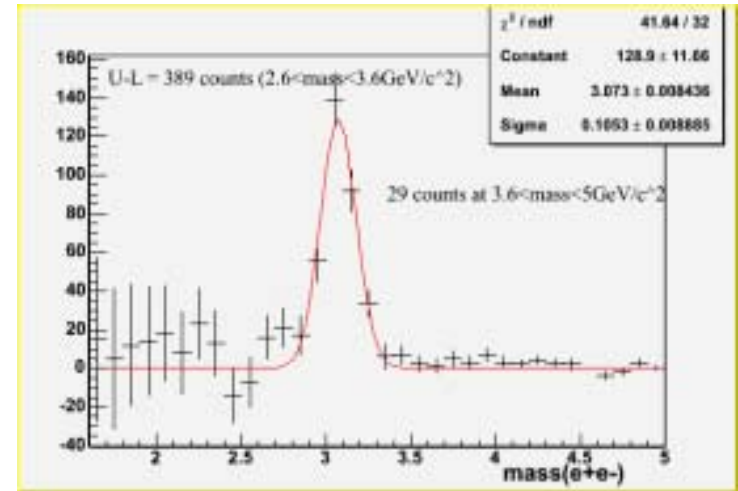
Data analysis

- Analyzed 3.5×10^6 Electron triggered events.
- Electron ID efficiency and Trigger efficiency are well studied.
- For acceptance calculation, used Run-2 simulation.
- As RICH can not separate electron and pion at $p_T > 5 \text{ GeV}/c$, only the tracks with $p_T < 5 \text{ GeV}/c$ were picked up

Invariant mass spectrum



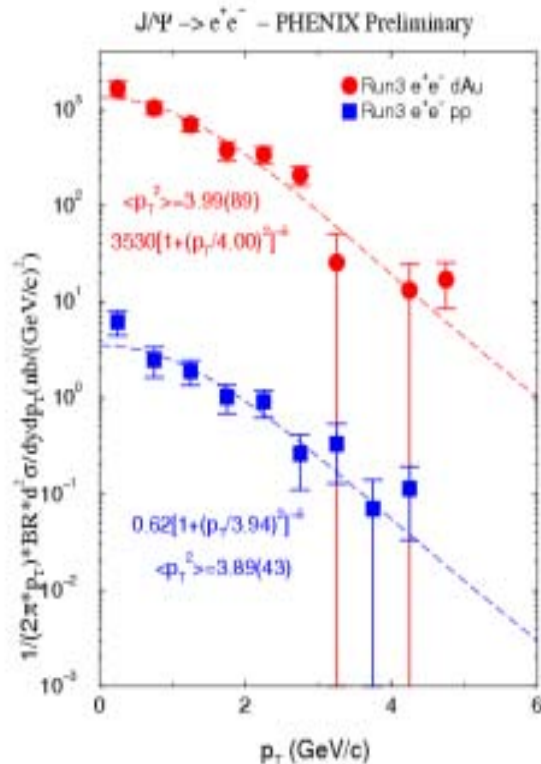
Invariant mass spectrum for electron pairs



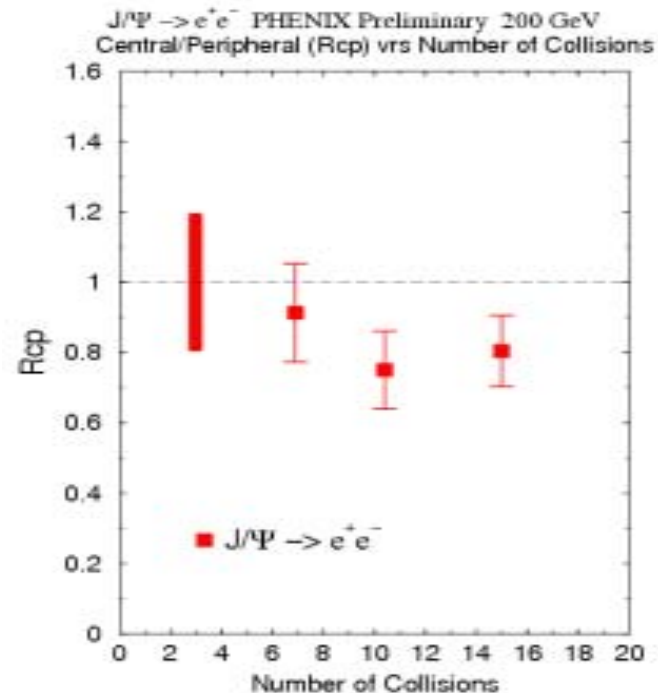
The unlike-sign pair spectrum (e^+e^-) after subtraction of like-sign pairs (e^+e^+ or e^-e^-) as combinatorial background.

Finally, 400 J/ψ could be reconstructed.

Preliminary results



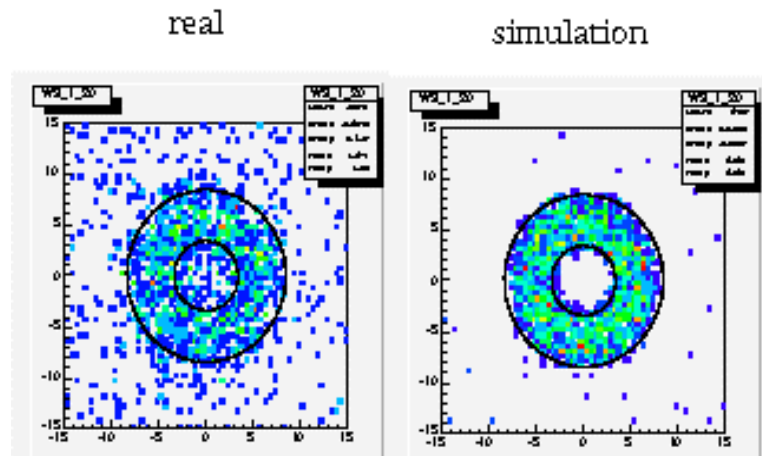
Preliminary result of invariant cross section vs. p_T for RUN3 d+Au and p+p.



Ratio of cross section per binary collision of each centrality divided by that of most peripheral collision

Studies ongoing

- More qualified analysis
 - Trouble shooting in bad data quality events
 - Run-3 based simulation
 - Correct acceptance
 - Response tuning



RICH ring in real data and in simulation

Summary

- Yield of J/ψ could be modified by the appearance of QGP in RHIC
- To understand modification in hot matter, yields and nuclear effect should be quantified.
- PHENIX collected 400 J/ψ in Run-3 experiment
- preliminary result for d+Au was shown